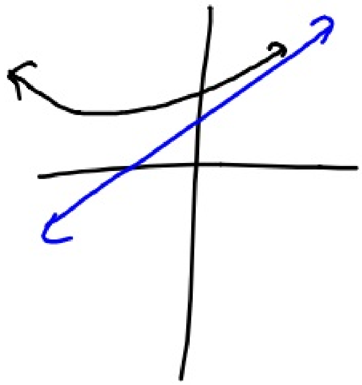
11-29-17



Slant asymptote only happens when top is 1 degree more than the bottom.

① $y = \dfrac{x^2+3x-1}{x+5}$

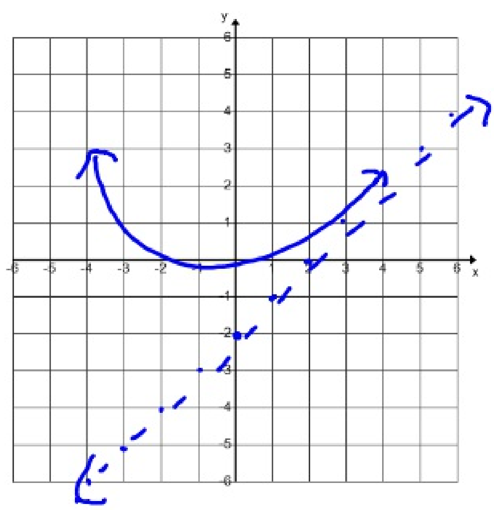
Slant:

$$\begin{array}{r} x-2 \\ x+5\,\big)\overline{x^2+3x-1} \\ -(x^2+5x) \\ \hline -2x-1 \\ -2x-10 \\ \hline \end{array}$$

Don't care about remainder

There is a slant asymptote at

$y = x-2$



(2) Find slant for

$$y = \frac{x^8+7}{x+5}$$

Can't do it because top isn't 1 degree more than bottom.

(3) Slant for

$$y = \frac{x^2+5x+1}{x+2}$$

$$\begin{array}{r} x+3 \\ x+2 \overline{) x^2+5x+1} \\ -(x^2+2x) \\ \hline 3x+1 \\ -(3x+6) \\ \hline \text{Don't care} \end{array}$$

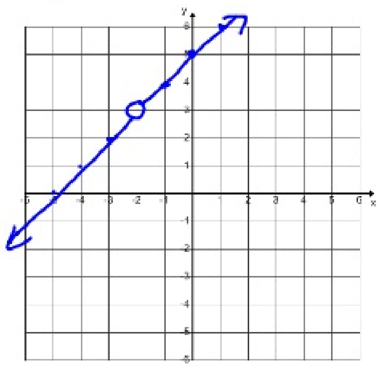
Slant at $y = x+3$

There is a problem when top can be FACTORED and things cross out.

(4) $y = \frac{x^2+7x+10}{x+2}$

$$y = \frac{(x+5)\cancel{(x+2)}}{\cancel{x+2}}$$

$y = x+5 \quad [x \neq -2]$



5 $$y = \frac{x^2+8x+12}{x+6}$$

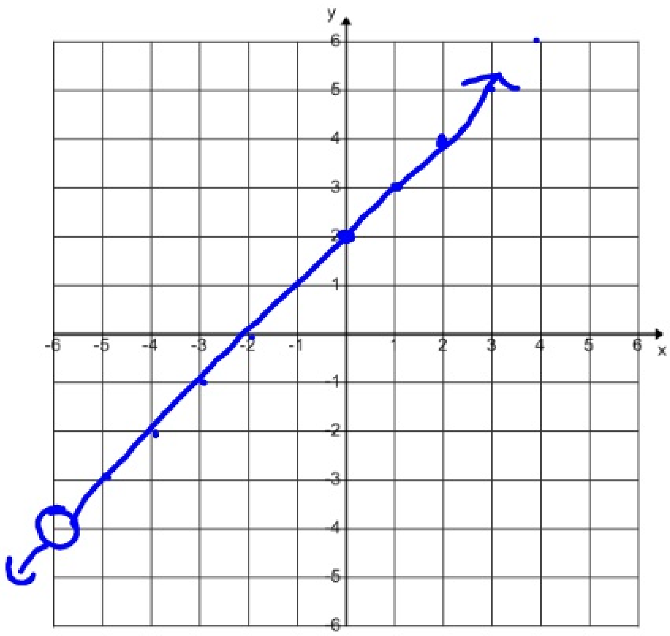
$$x+6 \overline{\smash{)}\,x^2+8x+12}$$

Don't do because top can be factored

$$y = \frac{\cancel{(x+6)}(x+2)}{\cancel{x+6}}$$

$$y = x+2 \quad [x \neq -6]$$

Hole at $x = -6$



(6) $y = \dfrac{x^2+5x+4}{x+3}$

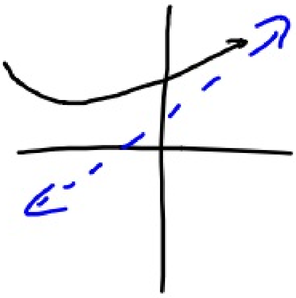
$$
\begin{array}{r|l}
 & \quad x + 2 \\ \hline
x+3 & x^2 + 5x + 4 \\
 & -(x^2 + 3x) \\ \cline{2-2}
 & \qquad 2x + 4 \\
 & \qquad 2x + 6 \\ \cline{2-2}
 & \qquad\quad -2
\end{array}
$$

Slant at

$y = x + 2$

11-29-17 3rd Trig

Slant asymptote

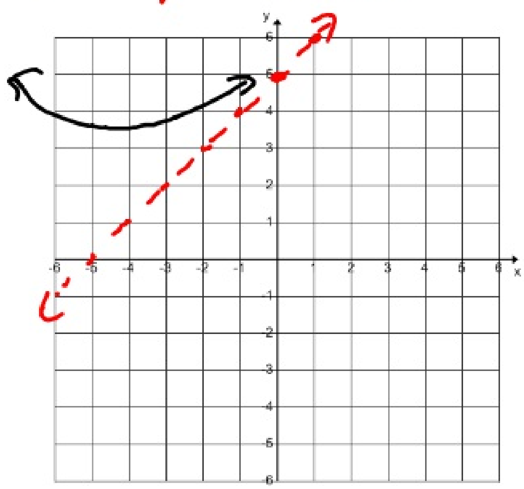


Slant asymptote occurs when top is 1 degree more than the bottom.

① $y = \dfrac{x^2+7x+1}{x+2}$

$$
\begin{array}{r}
x+5 \\
x+2\,\overline{\big)\,x^2+7x+1} \\
-(x^2+2x) \\
\hline
5x+1 \\
-(5x+10) \\
\hline
\text{Don't care}
\end{array}
$$

Slant asymptote is $y = x+5$



② $y = \dfrac{x^8+7x-1}{x^2+3}$

No Slant exists since degree of top is 6 more than bottom.

③ $y = \dfrac{x^2+10x+2}{x+3}$

$$
\begin{array}{r|l}
 & x+7 \\
\hline
x+3 & x^2+10x+2 \\
 & -(x^2+3x) \\
\hline
 & \quad 7x+2 \\
 & -\ 7x+21 \\
\hline
\end{array}
$$

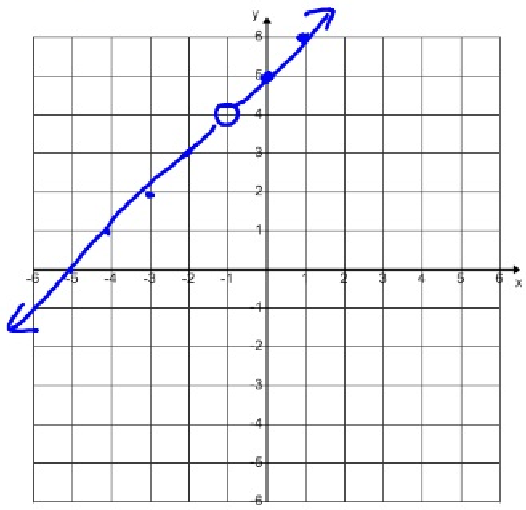
Slant asymptote is at $y = x+7$

There is another situation that could occur if top is 1 degree more than the bottom. It happens when top can be factored and things cross out.

④ $y = \dfrac{x^2+6x+5}{x+1}$

$y = \dfrac{(x+5)\cancel{(x+1)}}{\cancel{x+1}}$

$y = x+5 \quad [x \neq -1]$

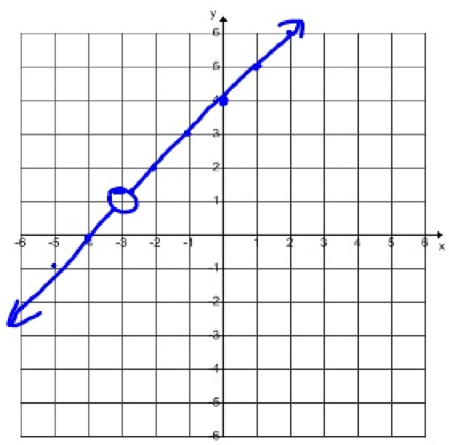


⑤ $y = \dfrac{x^2+7x+12}{x+3}$

$y = \dfrac{(x+4)\cancel{(x+3)}}{\cancel{x+3}}$

$y = x+4 \quad [x \neq -3]$

Hole at $x = -3$



⑥ $y = \dfrac{x^2+5x+4}{x+1}$

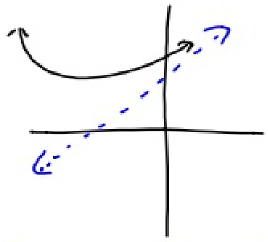
$$\frac{(x+4)\cancel{(x+1)}}{\cancel{x+1}}$$

$y = x+4 \quad [x \neq -1]$

Hole at $x=-1$

11-29-17 4th Trig

Slant asymptote



Slant only happens when top is 1 degree higher than bottom.

① $y = \dfrac{x^2+7x+2}{x+3}$

$$\begin{array}{r|l} & x+4 \\ \hline x+3 & x^2+7x+2 \\ & -(x^2+3x) \\ \hline & \quad 4x+2 \\ & -(4x+12) \\ \hline \end{array}$$

we don't care

Slant asymptote
$y = x+4$

② $y = \dfrac{x^4+3x-1}{x+5}$

No slant since top is not just 1 degree more.

③ $y = \dfrac{x^2+5x+1}{x+2}$

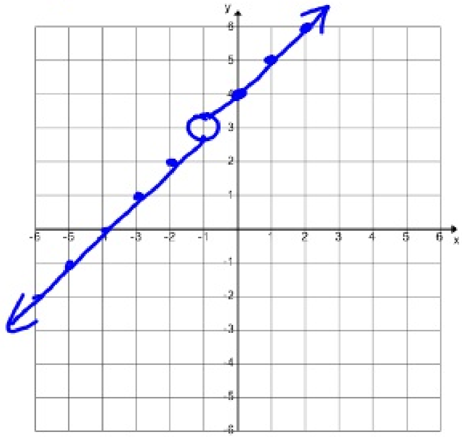
$$\begin{array}{r|l} & x+3 \\ \hline x+2 & x^2+5x+1 \\ & -(x^2+2x) \\ \hline & \quad 3x+1 \\ & \quad 3x+6 \\ \hline \end{array}$$

Slant at
$y = x+3$

④ $y = \dfrac{x^2+5x+4}{x+1}$

$y = \dfrac{(x+4)\cancel{(x+1)}}{\cancel{x+1}}$

$y = x+4 \quad [x \neq -1]$

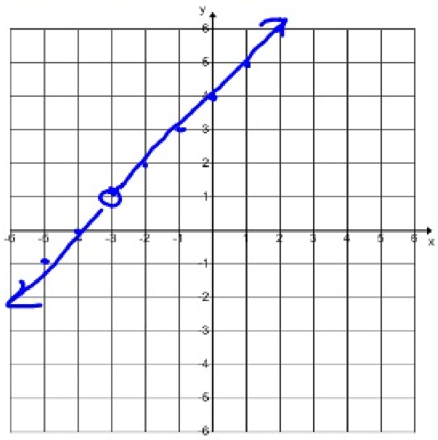


⑤ $y = \dfrac{x^2+7x+12}{x+3}$

$y = \dfrac{\cancel{(x+3)}(x+4)}{\cancel{x+3}}$

$y = x+4 \quad [x \neq -3]$

Hole at $x = -3$



⑥ $y = \dfrac{x^2+3x+2}{x+5}$

Since top doesn't have a $(x+5)$ in it when you factor it, there must be a slant asymptote.

$$\begin{array}{r} x-2 \\ x+5 \overline{) x^2+3x+2} \\ -(x^2+5x) \\ \hline -2x+2 \\ -(-2x-10) \\ \hline \end{array}$$

Slant at $y = x-2$

⑦ $y = \dfrac{x^2+7x+10}{x+2}$

$y = \dfrac{\cancel{(x+2)}(x+5)}{\cancel{x+2}}$

$y = x+5 \quad [x \neq -2]$

Hole at $x=-2$